VERSIONS WITH MARKING TO SHOW CHANGES MADE

IN THE TITLE:

SYSTEMS AND METHODS FOR OPTICALLY DETECTING AND INDENTIFYING OBJECTS IN AN ENVIRONMENT

IN THE SPECIFICATION:

RELATED CO-PENDING APPLICATIONS

The present invention is related to the following co-pending patent applications: Serial No. 09/724,819 entitled "Multiple Laser Optical Sensing Systems and Methods," filed November 28, 2000; Serial No. 09/834,242 entitled "Trainable Laser Optical Sensing Systems and Methods," filed April 12, 2001; and Serial No. 09/834,243 entitled "Motion Sensing Systems and Methods," filed April 12, 2001; and Serial No. 09/834,244 entitled "Laser Optical Area Scanner and Response System," filed April 12, 2001.--

IN THE CLAIMS:

1 (Twice Amended). An object detection and identification system, comprising:

a laser source with at least two emission apertures, wherein said laser source emits at least two laser signals into an environment [previously known by said system to be object free];

at least one reflected laser signal receivable by said at least one detector after emission of said at least

two laser signals from said laser source into and passing through said environment [previously known by said system to be object free]; and

a microprocessor operationally coupled to said at least one detector and having access to memory containing data associated with said environment and object characteristic data, wherein said microprocessor analyzes said at least one reflected laser signal received by said at least one detector to determine the x, y, and z presence and characteristics of objects entering said environment [previously known by said system to be object free].

2 (Twice Amended). The system of claim 1 further comprising a memory [further]for providing said system with storage of and access to environment and known object characteristic data.

3 (Twice Amended). The system of claim 2 including a database wherein characteristics of objects entering said environment [previously known by said system to be object free] are determined by said system based on comparison of said at least one reflected laser signal received by said at least one detector with said known object characteristic data stored in a database.

4 (Once Amended). The system of claim 1 further comprising a database storing reference characteristics of known objects and for providing access to said reference characteristics of known objects to said microprocessor.

5 (Twice Amended). The system of claim 4 wherein said laser source emits said at least two laser signals into said environment [previously known by said system to be object free, but] occupied by at least one object, said at least one detector detects said at least one reflected laser signal after said at least two laser signals pass through said environment [previously known by said system to be object free, but containing at least one object,] and said microprocessor determines object characteristics based on comparison of said signals received by said detector with said known object characteristic data stored in said database.

6 (Once Amended). The system of claim 1, wherein said laser source is a monolithic vertical cavity surface emitting laser array.

7(not amended). The system of claim 1, wherein said detector is a photodiode.

8(not amended). The system of claim 3, wherein said laser source is a vertical cavity surface emitting lasers.

9(not amended). The system of claim 3, wherein said detector is a photodiode.

10(not amended). The system of claim 5, wherein said laser source is a vertical cavity surface emitting lasers.

11(not amended). The system of claim 5, wherein said detector is a photodiode.

[determining] and occupying part of a controlled environment [previously known to be object free]

using an object detection system, said method comprising the steps of

sequentially emitting at least two laser signals into said controlled environment using a vertical cavity surface emitting laser structure;

receiving laser signals reflected from at least one object that may be within said controlled environment [with]using at least one detector; and

determining the x, y and z presence [or absence] of said at least one object in said controlled environment and further determining at least one characteristic of said at least one object, wherein at least one object is present and identifiable where said laser signals reflected by said at least one object are compared to at least one known object characteristic[s] stored in a memory, said at least one known object characteristic including at least one of an objects size, shape, orientation, speed and reflectance.

13. CANCELLED

14 (Twice Amended). A method of training an object detection and identification system to determine [object] characteristics of objects, said method comprising the steps of:

emitting at least two laser signals into a controlled environment using a vertical cavity surface emitting laser structure wherein at least one test object reflects at least one of said at least two laser signals;

receiving, by at least one detector, said at least one laser signal [said at least one laser signal] representing at least one object characteristic, including at least one of an object's size,

storing said at least one object characteristic in a memory

15 (Twice Amended). The method of claim 14 further comprising the steps of:

emitting at least two additional laser signals into a controlled environment [previously known to be object free] using a vertical cavity surface emitting laser structure;

receiving at least one of said at least two additional laser signals reflected by an object with at least one detector; and

determining characteristics of said object by comparing characteristics of said at least one of said two additional laser signals reflected by and associated with said object and received by said detector with said at least one object characteristics stored in said memory.

16 (Twice Amended). The method of claim 15, wherein said microprocessor determines the [size or shape]characteristics of said object by determining which of said at least two additional laser signals emitted into said controlled environment are received in the form of and represented by said at least one laser signal of said at least two additional laser signals reflected by said object and received by said detector.

17 (Twice Amended). A method for detecting the x, y, z presence of and determining the characteristics of an object in an environment, comprising the steps of:

a) training a laser optic object detection system with the characteristics of an [object-free] environment by:

object free] using a vertical cavity surface emitting laser structure.

receiving, by at least one detector, a first reflected laser signal reflected off of environmental characteristics representing said [object-free] environment;

storing said first reflected laser signal in memory, wherein said first reflected laser signal represents said environmental characteristics;

b) training said laser optic object detection system with the characteristics of at least one test object by:

emitting a second laser signal into said controlled environment [previously known to be object free] using said vertical cavity surface emitting laser structure, wherein said at least one test object reflects a second reflected laser signal;

receiving, by said at least one detector, said second reflected laser signal, said second reflected laser signal representing at least one object characteristic; and

storing said at least one object characteristic in said memory; and

c) detecting the presence of at least one object in said controlled environment by:

emitting a third laser signal into said controlled environment wherein an object interferes with said third laser signal and thereby reflects a third reflected laser signal defining the x, y and z location of said target;

receiving, by at least one detector, said third reflected laser signal; and

determining with a microprocessor the characteristics of said at least one object in said controlled environment by comparing said third reflected laser signal to said at least one object characteristic including at least one of an object's size, shape, orientation, speed and reflectance

18(Twice Amended). The method of claim 17, wherein [the size, shape and/or motion]characteristics of said at least one object [is]are determined by analyzing a plurality of third reflected laser signals received by said at least one detector after different sequences of said plurality of third reflected laser signals are emitted by said vertical cavity surface emitting laser structure as a plurality of third laser signals.

19. The method of claim 17, wherein angular or spatial location of said at least one object are determined by comparing over time absence of a specific said object by comparing sequences of said laser signals emitted with the sequences of said laser signals previously received by said detector.

20. The method of claim 17, wherein the presence or absence of a specific object is determined by comparing the sequences of said laser signals emitted with the array of said laser signals received by said detector.